THE TRANSIT OF VENUS.

Before snother impression of the Herald shall be in the hands of your readers, there will have ig. coourred an astronomical event which, for the ng last few years, has excited in a high degree the re- interest of the scientific world. I allude to the ch transit of Venus over the sun's disc early in the ed morning of the 9th of this month. It is generally known to the reading public that upon ea correct observations of this phenomenon, made an | in different parts of the world, depends the best ne determination of the solar parallax, and consequently the only reliable basis we possess nd upon which to rest all our conclusions respecting the magnitude of the scale upon ust | which the physical universe has been constructed. ot- The Greek astronomers, to whom we owe the earliest mathematical theory of the movements: of of the celestial bodies, made considerable prohe gross in a knowledge of the relative distances of en the planets from the sun, but of the absolute distances they knew nothing, with the single exception of the moon, the distance of which from the earth they determined with a remarkable degree of precision, upon a perfectly unexceptionable principle. They even endeavoured to determine the distance the sun from the earth (and if they had succeeded in their object, the result, combined with their knowledge of the relative distances of the planets from the sun, would having been induced to examine certain of the have put them in possession of the absolute dis-BY tances of the planets from the earth), but the problem was infinitely too difficult to yield to the resources of the existing condition astrod, nomy. With the revival of astronomy in modern times, numerous attempts were made to deter-

mine the distance of the sun from the earth, but

the problem still continued to baffle the efforts

of the most skilful astronomers.

not until towards the close of the seventeenth century, when immense progress had been made in the construction of astronomical instruments, when the principles of their adjustment were thoroughly understood and practised, and when the telescope was used not as an instrument for revealing the physical features of the celestial bodies but for the purpose of fixing their apparent positions in the celestial sphere, that the places of the sun and planets, as detertal mined by observation, attained such a degree of precision as to hold out any hope of furnishing reliable materials for arriving at a knowledge of their distances from the earth. The determination of the solar parallax by direct observations of the sun was very soon found to offer difficulties which were absolutely insurmountable, notwithstanding the immense progress which had been made both in theoretical and observational astronomy. Astronomers accordingly resolved to attack the problem by an indirect process. Obviously the chief difficulty of the problem for determining the distance of the celestial bodies consists in their excessive remoteness, compared with the smallness of the base from which the astronomer makes his observations. earth, no doubt, is a body of considerable dimensions, its diameter being about 8000 miles, and consequently a base line of some six or seven thousand miles might be found, from the extremities of which the astronomer might make simultaneous observations of the celestial body with the view of determining its absolute distance. But, after all, such a base line is utterly insignificant compared with the millions of miles which separate us from the nearest of the planets. The most feasible method, therefore, of attacking this vexed question of parallax was to choose for investigation the distances of such of the planets as approached nearest to the earth. Now, there are two planets which approach occasionally much nearer the earth than any of the other These are the planets of the solar system. he planets Venus and Mars—the one revolving immediately within the earth's orbit, the other immediately beyond it. The advantage of a successful solution of the problem of parallax as proposed in this manner is obvious; for the distance of any one of the planets from the earth being thus known, and the relative distances of the planets from the sun being already known. we readily ascend to a knowledge of the distance of the earth from the sun, and, the solar parallax being thus known, we arrive by a purely arithmetical process at a knowledge of the absolute distances of all the other planets from the sun.

er time when it approached very near the earth, and he concluded from his researches that the distance of the sun from the earth was eightyre five millions of miles. This was an immense step in advance, for even in the time of Kepler the distance of the sun from the earth was supposed not to exceed ten millions of miles. But a new solution of the problem of the solar parallax, founded upon observations of the planet Venus, was about the same time proposed by James Gregory, but it was reserved for Halley afterwards to explain fully its advantages and to insist strongly upon its practical application. Since this planet revolves within the

The first successful determination of the solar

parallax was accordingly founded upon observa-

tions of the planet Mars, at a time when its

position in its orbit offered special facilities for

this purpose. In virtue of a remarkable relation

in space which exists between the orbit of this

planet and the earth's orbit, it occasionally, when

in opposition, approaches very near to the earth

compared with the distance which usually

made careful observations of this planet at a

Cassini, an eminent French astronomer.

ng separates the two planets at the time of opposi-

earth's orbit, it may be seen on certain rare occasions, in the form of a round black spot. passing over the sun. A phenomenon of this kind has been technically termed the transit of the planet over the sun's disc. If we suppose two observers stationed at opposite places on the earth's surface, one near the North Pole and the other near the Scuth Pole, the rn, path described by the planet upon the face of the sun, as seen by the two observers, will be different. Now, it the planet and the sun were both ier indefinitely remote from the earth, there would be no sensible displacement of the planet as seen at the two stations. The magnitude of this got displacement constitutes, therefore, the hold which the astronomer possesses for ascertaining the absolute distances of the planet and the sun, nat or, which amounts to the same thing, the value of the solar parallax. Now, the displacement of the planet in this instance is best determined by a comparison of the chords which the planet describes in its passage over the sun's face, and these, again, are most readily ascertained by uil simply noting the time which the planet occut 6 pies in passing over the sun. The observation

of the transit at each of the two stations is therefore reduced to the noting of the precise time during which the planet appears upon the sun's disc. ost | On this ground the method has been termed the lay | method of durations. But the transit of the planet The supplies another method of a different kind. It is ner founded on the circumstance that a person on or the earth's surface generally sees the entrance ver of the planet upon the sun's disc at a different ood time from that at which he would see it enter if lls, he were stationed at the centre of the earth. In his some cases he would see it enter upon the ved disc earlier, in others laten, than if he were ed. at the earth's centre. These variations depend his on his position upon the earth's surface. as Similarly when the planet is quitting the sun's ain disc, the time of its egress will be different. a, a according to the position of the observer on the -Mr | earth's surface. In some instances the egress. ed, will appear earlier, in other instances it will the appear later than if wiewed from the earth's. centre. Now, the centre of the earth is the Reference has already been made to the prin- laundry near to a large quantity of cut livewell physical point to which all observations on tiple upon which astronomers have selected the The box which contained the ashes having taken the latest and the contained the ashes having taken the latest and the contained the ashes having taken the latest and the contained the ashes having taken the latest and the contained the ashes having taken the latest and the contained the ashes having taken the latest and the contained the ashes having taken the latest and the contained the ashes having taken the latest and the contained the ashes having taken the latest and the contained the ashes having taken the latest and the contained the ashes having taken the latest and the contained the ashes having taken the latest and the contained the latest and He the earth's surface must necessarily be reduced. Estations for observing the phenomenon in differ- fire communicated it to the cut fire starill was | We have here then the principle which must, ent parts of the world. Strictly speaking, a value which got up in a blaze. When the alarm with lavide the astronomer in collecting stations for lefthe parallel world. Strictly speaking, a value which got up in a blaze. When the alarm with guide the astronomer in selecting stations for of the parallax muy be deduced by a comparison was given, a number of the neighbour, look observing the transit of the planet. loor observing the transit of the planet. He must, of observations made at two stations suitably along with several workmen in the neighand endeavour so to choose two stations that white chosen. Let us take, for example, Woshoo, in bourhood, rendered all assistance they could have let one of them the ingrees of the planet to the Sandwick Talks, for example, Woshoo, in bourhood, rendered all assistance they could be the sandwick Talks, for example, Woshoo, in bourhood, rendered all assistance they could be the sandwick Talks. nave at one of them the ingress of the planet is the Sandwich Isles, and Kerguelen Island. Information of the outbreak of the lite resolved nere accelerated at the other it is retorted. here accelerated, at the other it is retarded. And The internal contact will be seen eleven Maryhill Police Office at the time the act. similarly with respect to the egross of the minutes. earlier from Woahoo, and twelve Court was sitting, and Captain Anderson, the

ined planet from the sun's disc. I have stated that minutes. later from Kerguelen Island than procurator-fiscal, immediately leth detailing pout the importance of the transits of Venus was use strongly impressed upon astronomers by Halley. Hance, the interval between the times of and proceeded to the scene of the fire, taking t 50 In 1761 and 1769 transits of the planet internal contact, as seen at Woahoo and Kergue. with him a number of police officers, provoid and were to occur, and it was in view ster- English astronomer made such an urgent call at two stations, where the internal contact at formed by which a continuous stream of water born upon astronomers to observe the phenomenon. g on The transit of 1761 was deemed of such im. the other, than if the phenomenon was seen at Provost Bruce sent for the Hillhead live have tove portance, that observers were despatched by I tick-the principal Governments of Europe to

dity. weather was generally unfavourable for the again where the egress of the planet may be the use of the Hillhead hose and the Glasgow ator. purpose, and the results on the whole were seen, but not the ingress. Finally, there are a firemen the fire was soon extinguished. not satisfactory. The transit of 1769 excited a few stations from which both the ingress and damage done to the laundry was considerable, atill degrees interest and the phenomenon — it is a stationary which both the ingress and damage done to the laundry was considerable. nday still deeper interest, and the phenomenon was the egress of the planet may be observed, the skiftings, roof, and door being partially above the skiftings. ains, observed very skilfully in a great number of Halley's method of durations is manifestly burned, and the house otherwise very much gave different parts of the world by observers repre- applicable to observations made at two suitably destroyed by the smoke and water. After the rest santing the weighted notions of Europe applicable to observations made at two suitably destroyed by the smoke and water.

the value of the solar parallax that astronomers or by combining two observations, one tepre. were induced to attach any confidence in the senting accelerated egress, the other retarded result. In accordance with his results, the sun's egress. The solution of the problem by this. distance from the earth amounted in round num method necessitates an exact knowledge of the bers to 95 millions of miles—a valuation which, longitudes of the two observing stations, to asisknown to most persons, has been inserted in all attain which will, in several instances, be thepopular text books of astronomy since that time. attended with considerable difficulty. Recent researches in astronomy have, however, shown beyond all doubt that the value of the steps by which the human mind is enabled to shown beyond an upune that the second in succession to the centemplation of was considerably in error. This was determined these lofty truths. First, the astronomer in the first instance by Hansen, from his researches measures a base line seven or eight miles in the lunar theory; afterwards by Le Verrier, in length upon the earth's surface, Com. from his researches in the planetary theory; about bining this result with the solar parallax, he the same time; again, by several astronomers determines the distances of the planets from from researches founded on observations on the the sun, their magnitudes and masses and planet Mars; and finally by experiments of two the velocities of their orbital movements, He French physicists—Foucault and Figeau—who computes the dimensions of the orbits of cometa determined the velocity of light, but found the and meteor streams, and assigns with precision result incompatible with the result previously the distances to which they necede into space arrived at by astronomical researches based when they have reached the aphelia of the regults. upon the generally-adopted value of the sun's Finally, assuming as a new base line for his According to the more recent researches the diameter of the ourth's othic researches, the sun's distance from the earth, la line measuring a little more than a billion of miles in land billion instead of amounting to 95 millions of miles, and eighty millions of miles in length, had distances and magnetical does not much exceed, if it does not even fall mines the distances and masses of the start. short of, 912 millions of miles. It was a matter He computes the velocities with which they

It may be imagined, therefore, that much interest was excited by the approaching transits; astronomy has disclosed to the restairing of the of the planet Venus in 1874 and 1882. As early as the year 1857, the Astronomer-Royal directed attention to the importance of these transits for arriving at a new solution of the important problem of the solar parallax, and he has on several subsequent occasions deemed. it his duty THE DISPUTE IN THE SHIPEUILDING to bring the question before the public. A few years ago, the Government having been made to understand the importance attached to the proper observation of this phenome non, induced Parliament to grant a considerable sum of money for the purpose of defraying the necessary expenses. The whole of the arrar gements connected with the observations of the transit, matters remain unchanged. which is to occur on Wednesday, have been planned and executed by the Astronomer-Royal. The stations originally chosen: for the purpose were-Alexandria, Honolulu, B. odriguez, New It was subse-Zealand, and Kerguelen Island.

researches of astronomers.

quently considered desirable to supplement the station at Honolulu by two additional stations at some distance apart. These are Hawaii and Kauai. An additional station has also been attached to Kerguelen Island, and done, at Cairo, in connection with the station at A lexandria. Furthermore, two stations have been established in India. In addition to these purep arations, the transit will not fail to receive du eat tention at the observatories of Melbourne, S ydr ley, the Cape of Good Hope, and Madras. Colonial Governments of Aust ral is have voted special grants of money for tion of the phenomenon. Then there is the very complete expedition Lord Lindsay, with the view of observing the transit at the Mauritius. Col o nel Campbell, of Blythswood, has also undertal ic in to observe the phenomenon at Thebes. The various observing parties despatched from Groe awich have been furnished with an admirable er praipment of instruments with the use of which the several observers have undergone a cours e of training at the Royal Observatory during the last two or three years, under the guidance € f Captain Tupman, R.M.A. Photography will 1 m used in councetion with the observatories it all the stations. Mr Warren De La Rue has iberally undertaken to superintend this part of the Greenwich arrangements. The observers connect e d with the various Greenwich expeditions are: chiefly naval officers,

and artillery, and a few p.n. following plan of arrange appointment of the diff drawn up and issued so ... Astronomer-Royal:— Appointments of Observers Observation, and Subs n dination of Observers. "1. Captain G. L. Tu man, R.M.A., is head of the entire enterprise, a a d is responsible, through

with the addition of some to

Ecers of the engineers

Sandwich Islands—

Hawaii—Chief,

G. L. Tupman, astro-

Nichol, astronomer and

onomer; observer, H. G.

iguez-Chief, Lieut, C. B.

capher; Lieut. R. Hoggan,

ristchurch (New Zealand)-

ier, R.E.; observers, Lieut.

the Astronomer-Royal, every part. Every o

Captain Tupman.... "2. When the differ out expeditions are separated, the observers in .e. ach district of observation are responsible to the: local chi ef of the district, and the chief to the AJ 3 tronomer Royal. The districts of observation r. and the of servers will be the following, the name fi st following that of the local chief being that of the deputy, who will, if neces-

Browne, R.A., astno nomer; observers, Capt. W. de W. Abney, R.E., S. Hunter, astronom "4. District B. Chief, Capt. G. L. necessary, Prof. G. "Sub-divisions Honolulu-Chief, Captain

nomer; observers,

Forbes.

of the

J. W.

photogr

apher.

photographer.

:, R.N.

photographer; Lie...atenan' t F. E. Ramsden, R.N., astronomer and 1 Professor G. Forb. es, astr Barnacle, astrono ner. B astronomer; obs erver, R.E.M., astrono ner. "5. District (!. Rody Neate, R.N., ast conomy astronomer and photogr R.N. astronome ir and 6. District. D. Ch

L. Darwin, R. E., ast Lieut. H. Craw ford, J. "7. District E. Chief, Rev. S., J. 📝 Lieutenant C. Corba "Sub-divisions of t mas Harbourt, Chief and photographer; astronomers; Lien

astronomen; J. B.

grapher. Port 2

Chief, Major H. L. Pake

Corbet, R. N.; Coke, R.N. "8. In addition commissioned off Royal Engineers districts, and wil of each district. Expeditions also been sent

Holland, Ru America. The observ in noting V in its passe conjact w

ingress a

the Government

from, the egress. situate: the ints rnal contact at ingress on the morning | plainant. of the ? 1th of December at 2 h. 15 m. Greenwich mean. ime, and he would see the internal con: HILL.—Yesterday morning, fre broke out in the tack with egress at 5 h, 57 m. The included laundry of the house situated at No. 5 Kelvin inters /al of time is therefore 3 hours 42 minutes. | side Terrace North, Maryhill, the residence of Builty the interval of time which clapses between Mr James C. Kemp, of the firm of Messis David that instant when the planet first impinges on the Kemp & Son, shawl manufacturers, 37 Euchanin sold r disc, and the instant when it finally leaves Street, Glasgow. The fire is believed to have disc is necessarily somewhat greater. It been caused by one of the servants having the air counts, in fact, to 4 hours 41 minutes.

if it were viewed from the earth's centre, his duty as procurator-fiscal to Inspector Day, len Island, amounts to 23 minutes. Similarly, Bruce, Hillhead, and Provost Shaw, Maryaill, of the approach of these two eyents, that the the astronomer combines the observations made had preceded him, and a "chain" had been section actions made a preceded him, and a "chain" had been section as the control of the control egiess is seen earlier in the one case, and later in from buckets was directed against the flames. the centre of the earth. There are certain stations of observation where Bryson, of the Glasgow Fire Brigade, had land observe the phenomenon in various parts, of the ingress of the planet can be seen, but not arrived on the ground with an engine—having Unfortunately, however, the the egress. There are certain other stations been telegraphed for by Mr Kemp-and with

senting the principal nations of Europe. The chosen stations of the last kind. In general, Police Court at Maryhill had finished its results of the observations were rather disthe cordinate, in so far as they gave an indication transit will consist in noting the procise time the assessor, drove to the scene of the fire, and m in of the sun's distance from the earth; and lebris it was not till 1824, when the celebrated astronomer Encke discussed the totality of the observations of the two transits of the solar parallax may then be solved desirability of having a properly equipped joint by combining two observations, one solved desirability of having a properly equipped joint by combining two observations, one solved desirability of having a properly equipped joint by combining two observations, one solved desirability of having a properly equipped joint by combining two observations, one solved desirability of having a properly equipped joint by combining two observations, one solved desirability of having a properly equipped joint by combining two observations, one solved desirability of having a properly equipped joint by combining two observations, one solved desirability of having a properly equipped joint by combining two observations, one solved desirability of having a properly equipped joint by combining two observations, one solved desirability of having a properly equipped joint by combining two observations, one solved desirability of having a properly equipped joint by combining two observations, one solved desirability of having a properly equipped joint by combining two observations.

I shall conclude with a statement of the of great satisfaction to astronomers, therefore, "travel in space, and compared them in this respect with the movement of the solu when Stone, who was then first assistant at the system in space. Royal Observatory at Greenwich, and is now informs him respecting the materials of which Her Majesty's Astronomer at Cape of Good Hope, those remote bodies consist, and thus texting him another important fact in support of the original observations of the transit of 1769 which grand ductrine that the sun is no other than had excited some suspicion, found that by putting star, and that the innumerable bodies of trestellar a juster interpretation upon the observations vault are magnificent globes of light, rivalling than Encke had done obtained a value of the solar the sun in magnitude and splendour. We have parallax agreeing very well with the mean of here presented to us a striking instance of the the determinations arrived at by the recent sublimity of the views respecting the immensity

TRADE NEWS.

The Observatory, Dec. 8, 1874.

human mind.

The joiners and carpenters in the susployment of Messrs John Elder & Co. at Fair keld, and Man Wingate at Whiteinch, still continue out, Touch the old rates have been conceded to Messa Stephen's men, they had not all returned to work

yesterday; and they appear disposed, now that

they are out, to take a boliday cutwo, Uthirves

of the physical universe which the science of

The employers had a meeting posterday titer. moon, but the proceedings were private, RENFREW. The workmen who struck work in the shipbuild. ing yards of Messrs Henderson, Coulbone & Co and Messre W. Simons & Co., we still inten-

settlement of the dispute. Massers Headerson Coulborn & Co., during the past year, have buit seven steamers and one sailing youth, of the way in all. At present the same firm have there same steamers on hand, with an aggregate of 1000 ton all these vessels being in a forward state. The builders, we are informed, are in these contracts exempted from penalties by a "strike clause" in the agreement with the owners. They have also con tracted for a steamer of 500 tons. It may be stated. Some of the on the authority of the firm, that the engineers employed in this yard agreed with the comployer to accept a reduction of about Is per neek, or uppal the observato 3 per cent. to 4 per cent. on previous rates, as a compromise of the proposed reduction. They fitted out by began work on Friday on these terms, but after working for some three hours they left in a bold without condescending upon any teason for the change in their resolution. MOTHERWELL. - Malleable Iron, Trade - Tee. malleable iron trade at the Motherwell her Works has been dull for some time. The workness frag

that there will be another break in the water An intimation was published at the works on Saturday to the effect that instead of the usual 14 days' to lice to leave, they are about to be put on a day souske. DUNDER. -- Strike of Mill and Fuctory Worker -The reduction of wages paid in Dances will and factories has had the effect of causing a sort of strike among the workers, and yesterday most of the works in the west end of the town were cicked in the

section of the workers stayed out-generally too weavers—but the employers put off the whole, the one portion being dependent on the other. It is not expected that the interruption will last beyonds day or two at most, and several millowners threaten, unless the workers resume immediately, to pat of their works entirely till after the New Year. There is a rumour that one arm at least intends doing this at anyrate, and rumour also has it that another firm has resolved to put off all Saturday, and stop at five o'clock instead of six on other days of the week. It is extremely probable that short time, in some shape or other, will now be resorted win a good many works, whatever course of action the larger firms in the trade may pusce, so greatly the depression presently prevailing in the trade. THE LAMBERT FUND.—We have to acknow. ledge receipt of the following sums: -John

Elizabeth Anderson, farm servant, residing at Maryhill, was convicted before Sheria Marny of having deserted the service of John Young.

GLASGOW PHILOSOPHICAL SOCIETY. - A MEET ing of the members of the Chemical Section wet place last night in the Lecture Hall, Corporation Galleries. There was a poor attendance. Mr G. Combe Stewart, F.C.S., Greenock, read a

paper "On the Chemistry of Sugar Refining." and was awarded a hearty vote of thinks THE LIQUOR HARVEST. - Yesterday, at the Central Police Court—Bailie Torrens presiding -there were 73 charges against persons to having been found drunk and incapable. Of these, 57 were men and 16 women. 29 men were fined in the sum of 5s, and in 28 cases the

pledges were forfeited. Five women were fined, eight were admonished, and in three cases the pledges were forfeited. PAWNBROKER'S CASE. — Yesterday, at the Justice of Peace Court-before Messrs John Cairns and Joseph M'Lean-James B. Lunding pawnbroker, East Clyde Street, was charged with having failed to deliver up a quantity of repp cloth, valued at 29s, which had been pledged with him. He was ordered by the Court to pay

ago by a woman named Miller. At the expirato these gentlemen, three non- tion of a year she paid the interest on it. When icers or privates of the corps of the second year expired she again paid a year's will be attached to each of the five interest, and expressed a desire to see the lites, t be under the direction of the chief and on its being shown her she expressed her belief that the dress produced was not hers, as for observing the transit have it was of inferior quality. She also perceived to various parts of the world by that the wrapper in which the article wal ents of France, Germany, Italy, wrapped was not the one in which she had ssia, and the United States of pledged it. The defendant, however, contended it was her property, and hence the present provation of the transit of Venus consists | ceedings. The defendant and assistant will de precise instant when the planet, gave evidence to the effect that the dress [10] ge over the sun's disc, forms internal duced was the one pledged by Miller, th the margin of the, sun at its ticket upon the parcel having been hardel w pon the solar disc, at its egress the Bench, it was detected that it had been disc, or at both ingress and previously affixed to another parcel—there being we suppose an observer to be fragments of a newspaper adhering to the bick at the centre of the earth, he would see The Court therefore decided in favour of com-FIRE AT KELVINSIDE TERR, CE NORTH, MARY

advertently placed a quantity of hot ashes in the By the time it was connected, however, Mr

TRADES.

Nay, the spectroscope

overtures having yet been made on either ar ion

greater part of the day. In many cases, only a

ivate observers. The ments relative to the erent observers was te months ago by the to the several Districts of to the Viovernment tor server is responsible to Marshall, 10s; Mrs Marshall, 10s. MASTER AND SERVANT Case. - Yesterlay,

sary, take his place...
3. District A. Talgypt—Chief, Capt. C. O. estronom er and photographer; farmer, Househillwood, Hurlet, and fined in £2 10s, including costs. Sandye. .ch Islands-General Tupma, R.M.A.; deputy, if

> therefor. .anai-Chief, R. Johnson, Lieut. E. J. W. Noble, r; observers, C. E. Burton,

ronomer and photographer; d.N., astronomer. Kerguelen Island -- General 'erry; deputy, if necessary, he Kerguelen Island:—Christ-, Rev. S. J. Perry, astronomer bservers, Rev. W. Sidgreaves, enant S. Goodridge, R.N., the value of the cloth, and £1 178 Ed of Smith, astronomer and photo-It appeared that the cloth had expenses. aliser: Chief, Lieutenant C. been pawned with defendant about two years observer, Lieutenant G.

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